



# CITY COUNCIL

## AGENDA REQUEST

<b>AGENDA OF:</b>	<b>01-17-12</b>	<b>AGENDA REQUEST NO:</b>	<b>IV-G</b>
<b>INITIATED BY:</b>	<b>JESSIE LI, PH.D., P.E., ASSISTANT UTILITIES DIRECTOR</b>	<b>RESPONSIBLE DEPARTMENT:</b>	<b>UTILITIES</b>
<b>PRESENTED BY:</b>	<b>PATRICK WALSH, P.E., DIRECTOR OF TRANSPORTATION &amp; LONG-RANGE PLANNING</b>  <b>JESSIE LI, ASSISTANT UTILITIES DIRECTOR</b>	<b>DIRECTOR:</b>	<b>SUELLEN STAGGS, DIRECTOR OF UTILITIES <i>SS</i></b>  <b>PATRICK WALSH, P.E., DIRECTOR OF TRANSPORTATION &amp; LONG-RANGE PLANNING <i>PW</i></b> <b>CHRISTOPHER STEUBING, P.E. CITY ENGINEER <i>CLS</i></b>
<b>SUBJECT / PROCEEDING:</b>	<b>WATER MASTER PLAN PHASE I UPDATE (CIP WA1201) AUTHORIZE ENGINEERING SERVICES CONTRACT</b>		
<b>EXHIBITS:</b>	<b>ENGINEERING SERVICES CONTRACT WITH ALAN PLUMMER ASSOCIATES, INC.</b>		
<b>CLEARANCES</b>		<b>APPROVAL</b>	
<b>LEGAL:</b>	<b>JOE MORRIS, CITY ATTORNEY <i>JM</i></b>	<b>ASSISTANT CITY MANAGER:</b>	<b>KAREN GLYNN <i>KG</i></b>
<b>PURCHASING:</b>	<b>TODD REED, PURCHASING MANAGER <i>TR</i></b>	<b>ASSISTANT CITY MANAGER:</b>	<b>KAREN DALY <i>KD</i></b>
<b>BUDGET:</b>	<b>JENNIFER BROWN, <i>JB</i> DIRECTOR OF BUDGET &amp; RESEARCH</b>	<b>CITY MANAGER:</b>	<b>ALLEN BOGARD <i>Allen Bogard</i></b>
<b>BUDGET AND FUNDING SOURCE</b>			
<b>EXPENDITURE REQUIRED: \$</b>		<b>210,000</b>	
<b>CURRENT BUDGET: \$</b>		<b>350,000</b>	
<b>ADDITIONAL FUNDING: \$</b>		<b>N/A</b>	
<b>RECOMMENDED ACTION</b>			
Authorize an engineering services contract for Phase I of the 2012 Water Master Plan Update (CIP WA1201) with Alan Plummer Associates, Inc., in an amount not to exceed \$210,000.			

## EXECUTIVE SUMMARY

The City is currently relying on the 2007 Water Master Plan in planning and funding water infrastructure to meet the growth of Sugar Land. The objective of the existing Water Master Plan (WMP) was to provide the City with a tool for timing and planning of the construction of needed water system infrastructure to assure adequate capacity was built to accommodate growth and new development.

A new update to the existing WMP is needed to accommodate development needs, meet regulatory requirements, integrate surface water conversion, and provide water resource planning. Since 2007, the water system needs have also changed due to regulatory requirements imposed by governmental agencies such as TCEQ and the Fort Bend Subsidence District (FBSD). TCEQ has mandated rules and requirements for water quality management and monitoring as it relates to the formation of disinfection byproducts (DBP rule). Development of the monitoring plan requires many of the elements included in the more traditional Water Master Plan; specifically, system modeling and calibration will be used to develop water quality analysis.

The objectives of this Water Master Plan update have been expanded and modified to meet the broader, comprehensive city goals as established in the City's Comprehensive Plan and Vision 2025. To accomplish this, the Water Master Plan has been divided into two phases.

Phase I will include "traditional" master planning functions relating to planning for growth and regulatory requirements. This planning involves the development of growth projections and a water system model. The Phase I work will deliver a tool for timing and planning of construction of needed water system infrastructure to assure adequate capacity was built to accommodate growth and new development. This tool will include a 5-year program of capital projects.

Phase I will also address the regulatory requirements. To be in compliance with TCEQ, the City must submit the required Initial Distribution System Evaluation monitoring plan no later than June 2012. Development of this monitoring plan requires system modeling and calibration that will be used to develop water quality analysis.

The Phase I scope of work will include the following major items:

- Define planning criteria and boundary conditions
- Develop water planning data
- Inventory system infrastructure assets
- System modeling, calibration, and analysis
- GRP accounting model development
- Water quality modeling
- Initial Distribution System Evaluation monitoring plan development
- 5-year CIP plan development

In effort to more effectively accomplish the City's vision as described in the Comprehensive Plan and the City's "Vision 2025" document, the City is modifying its approach to master plans in general. Under the new approach, master plans will be more directly utilized to implement the goals in the Comprehensive Plan. This approach will require the WMP project to include a robust public input process to address relevant policy issues. Specifically, this process will further define the Comprehensive Plan's goals and objectives that relate to the City's water system. Once defined, the goals and objectives will be used to develop strategies and specific initiatives to accomplish the City's vision. The ongoing Ground Water Reduction Plan Strategic Project will also help refine the scope of work for Phase II.

The two-phased approach is necessary for the City to meet the TCEQ's June 2012 deadline. The contract's Phase II scope is defined broadly for now, and will return to the City Council for a contract amendment with a fee and

refined scope at a later date. The \$210,000 fee in this contract covers Phase I only.

A Request for Proposals (RFP) was published in October 2011. A total of eight proposals were received. The top four were selected for interviews. Alan Plummer Associates, Inc. was selected because of their excellent overall approach to the project.

The Utilities, Engineering and Transportation & Long-Range Planning departments recommend that City Council approve the Engineering Services Contract with Alan Plummer Associates, Inc. in the amount of \$210,000 for the 2012 Water Master Plan, Phase I Update. Funding for the project is budgeted and is available in CIP WA1201.

#### EXHIBITS

**CITY OF SUGAR LAND STANDARD CONTRACT  
FOR PROFESSIONAL ENGINEERING DESIGN  
SERVICES FOR CITY FACILITIES**

Over \$50K - Form Revised 3/1/10

**I. General Information and Terms.**

Engineer's Name and Address: Alan Plummer Associates, Inc.  
3100 Wilcrest Drive # 270  
Houston, Texas 77042-3530

Project Description: Water Master Plan Update

Maximum Contract Amount: \$210,000

Effective Date: On the latest date of the dates executed by both parties.

Termination Date: (See III F)

Contract Parts: This Contract consists of the following parts:

- I. General Information and Terms
- II. Signatures
- III. Standard Contractual Provisions
- IV. Additional Terms or Conditions
- V. Additional Contract Documents

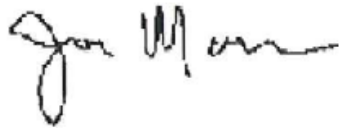
**II. Signatures.** By signing below, the City and the Engineer agree to the terms of this Contract.

**CITY OF SUGAR LAND**

\_\_\_\_\_  
City Manager or Assistant City Manager

Date: \_\_\_\_\_

Reviewed for Legal Compliance:



**ENGINEER:**

By: 

Date: 1-9-2012

### III. Standard Contractual Provisions.

#### A. Definitions: In this Contract:

*Construction Documents* means the plans, drawings, specifications, descriptions, or similar design related documents prepared by the Engineer for the Project under this Contract.

*Contract* means this Standard Contract for Professional Engineering Design Services, made in compliance with Chapter 2254 of the Texas Government Code.

*Contractor* means the person or entity that the City contracts with to construct the Project.

*Engineer* means the person or entity named in Part I of this Contract.

*Project* means the design and construction of the City improvements or structures described in this Contract.

B. Engineer's Services. The Engineer will provide to the City design services and any other related services for the Project as described in this Contract under the terms and conditions of this Contract.

C. Construction Documents. The Engineer's Construction Documents will be sufficiently accurate, detailed, and complete so that the Contractor may, if the Contractor faithfully follows the Construction Documents, construct and complete the Project without substantial defects and within the projected schedule and budget. In this paragraph, a "substantial defect" includes any condition of the Project that, upon completion, prevents or interferes with the Project's proper or intended operation, use, function, or maintenance. The Engineer will promptly correct any error found in the Construction Documents, including any error discovered after the City makes final payment to the Engineer, without payment of additional compensation.

D. Project Visits. If the Engineer's Additional Contract Documents provide for the Engineer to visit the Project site, the Engineer will visit the Project Work at intervals appropriate to the stage of the Project construction, but not less than the minimum number of visits specified in the Engineer's Additional Contract Documents, if any. The Engineer's visits will include visits at times when the significant elements of the Project construction, or representative samples thereof, are being performed so that the Engineer may determine if the Project is being constructed in substantial compliance with the Construction Documents. The Engineer will keep the City informed of the progress and quality of the Project construction as it is completed and promptly notify the City in writing of any Project construction that does not substantially comply with the Construction Documents.

E. Billing and Payment. The Engineer will bill the City for the services provided at intervals of at least 30 days, except for the final billing. The City will pay the Engineer for the services provided for in this Contract from current revenues available to the City, but all the City's payments to the Engineer, including the time of payment and the payment of interest on overdue amounts, are subject to the provisions of Chapter 2251 of the Government Code. The City is not liable to the Engineer for any taxes which the City is not liable by law, including state and local sales and use taxes (Section 151.309 and Title 3, Texas Tax Code) and federal excise tax (Subtitle D of the Internal Revenue Code). Accordingly, those taxes may not be added to any bill.



F. Termination Provisions.

(1) Unless terminated earlier as allowed by this Contract, this Contract terminates:

(a) On the termination date, if any, specified in the General Information in Part 1, but the obligation of a party to complete a contract requirement pending on the date of termination survives termination; or

(b) If there is no termination date specified in the General Information in Part 1, the Contract terminates when both parties have completed all their respective obligations under the Contract.

(2) The City's city manager may terminate this Contract during its term at any time for any reason by giving written notice to the Engineer not less than five business days prior to the termination date, but the City will pay the Engineer for all services rendered in compliance with this Contract to the date of termination.

(3) If the City's city council does not appropriate funds to make any payment for a fiscal year after the City's fiscal year in which the Contract becomes effective and there are no proceeds available for payment from the sale of bonds or other debt instruments, then the Contract automatically terminates at the beginning of the first day of the successive fiscal year. (Section 5, Article XI, Texas Constitution)

G. Liability and Indemnity. Any provision of the Contract is void and unenforceable if it: (1) limits or releases either party from liability that would exist by law in the absence of the provision; (2) creates liability for either party that would not exist by law in the absence of the provision; or (3) waives or limits either party's rights, defenses, remedies, or immunities that would exist by law in the absence of the provision.

H. Assignment. The Engineer may not assign this Contract without the City's prior written consent.

I. Law Governing and Venue. This Contract is governed by the law of the State of Texas and a lawsuit may only be prosecuted on this Contract in a court of competent jurisdiction located in or having jurisdiction in Fort Bend County, Texas.

J. Entire Contract. This Contract represents the entire Contract between the City and the Engineer and supersedes all prior negotiations, representations, or contracts, either written or oral. This Contract may be amended only by written instrument signed by both parties.

K. Independent Contractor. The Engineer will perform the work under this Contract as an independent contractor and not as an employee of the City. The City has no right to supervise, direct, or control the Engineer or Engineer's officers or employees in the means, methods, or details of the work to be performed by Engineer.

L. Dispute Resolution Procedures. If either party disputes any matter relating to this Contract, the parties agree to try in good faith, before bringing any legal action, to settle the dispute by submitting the matter to mediation before a third party who will be selected by agreement of the parties. The parties will each pay one-half of the mediator's fees.

M. Attorney's Fees. Should either party to this Contract bring suit against the other party for any matter relating to this Contract, neither party will seek or be entitled to an award of attorney's fees or other costs relating to the suit.

N. Severability. If a court finds or rules that any part of this Contract is invalid or unlawful, the

remainder of the Contract continues to be binding on the parties.

O. Contractual Limitations Period. Any provision of the Contract that establishes a limitations period that does not run against the City by law or that is shorter than two years is void. (Sections 16.061 and 16.070, Texas Civil Practice and Remedies Code)

P. Conflicting Provisions. If there is a conflict between a provision in the Engineer's Additional Contract Documents and a provision in the remainder of this Contract, the latter controls.

**IV. Additional Terms or Conditions.** None.

**V. Additional Contract Documents.** The following documents attached to this Contract are part of this Contract:

A. Engineer's Additional Contract Documents:

1. Alan Plummer Associates, Inc. Scope of Services (18 pages)

B. City's Additional Contract Documents:

1. Insurance Form (2 pages)]

## **ATTACHMENT A**

### **SCOPE OF SERVICES - WATER MASTER PLAN**

The following scope for services is divided into two phases. A detailed scope and compensation summary is provided for Phase I, 2012 Master Plan Update. The final scope and budget of Phase II, the Future Water System Plan is dependent on the data and information developed in Phase I. Therefore, a more detailed scope and budget for Phase II will be developed during Phase I and added by amendment to this contract.

## **BASIC SERVICES**

### **PHASE I – 2012 MASTER PLAN UPDATE**

Phase I of the Water Master Plan provides an update of the 2007 Water Master Plan with a focus on the development of the near term 5 year Capital Improvement Program (CIP) for the Sugar Land water system. This initial phase follows traditional growth and water demand forecasts, hydraulic modeling of the current and future water demands, identification infrastructure needs to satisfy those demands and the prioritized recommendation of near term (5 year) capital improvements. In addition to the traditional master planning services, Phase I will provide an update of the City's 2008 Groundwater Reduction Plan and an Initial Distribution System Evaluation (IDSE) System Specific Study Sampling Plan to comply with TCEQ Disinfection Byproduct Rule requirements and recommendations for the City's FY2013 CIP will be provided as early deliverables prior to completion of the Phase I effort. Phase I will be completed in the following eight tasks:

#### **1) DEFINE PLANNING CRITERIA AND BOUNDARY CONDITIONS**

This task defines the basic criteria and boundary conditions for the City of Sugar Land's 2012 Water Master Plan Update. The City's established planning process will provide a framework for the planning process. Starting with the 2007 Water Master Plan Update (2007 WMP) as a baseline, planning criteria and requirements will be updated including population and land use projections, regulatory criteria and other fundamental criteria that will serve as the basis for the Plan.

##### **a) Define the 2007 Baseline**

The 2007 Water Master Plan Update will be reviewed to establish the current baseline for the water plan. Population, land use, water consumption criteria, fire flow and other base planning data will be summarized. The 2008 Ground Water Reduction Plan (GRP) will also be reviewed to summarize the City and Co-participants baseline data and plans to meet the Fort Bend County Subsidence Districts (FBCSD) regulatory requirements.

##### **b) City of Sugar Land Planning Criteria**

The City's comprehensive planning criteria and Vision 2025 and Guiding Principles Document will be reviewed to integrate the 2012 WMP with the City's long range planning process. The specific strategic goals and objectives that address water system planning and infrastructure needs will be incorporated into the planning criteria. This sub-task will also define the basis or source of the fundamental City planning criteria including population forecasts, land use plans, annexation and future ETJ growth plans, and redevelopment plans. This fundamental planning data should be consistent with the City's comprehensive long term planning criteria. The fundamental planning



criteria of the City's Utility department will also be documented including established water production criteria and customer service levels. The potential interface with other City departments and their individual planning efforts will also be identified.

**c) Regulatory Criteria**

The current and future regulatory criteria that could potentially impact the city's water supply, treatment, and distribution will be identified. The Texas Commission on Environmental Quality (TCEQ) and US Environmental Protection Agency (EPA) have established regulations for the production of both groundwater and surface water. The future direction of evolving drinking water regulations and established regulatory update plans will be characterized relative to the 2012 WMP. The City's current Vulnerability Assessment and Risk Management Plans will also be reviewed to define any update requirements. Groundwater production is regulated under the FBCSD 2003 Regulatory Plan along with its subsequent amendments. Fundamental groundwater reduction criteria and over conversion and conservation credits will be summarized.

**d) Fire Protection Criteria**

Fire protection demand at fire hydrants is a critical factor in water distribution system hydraulic criteria. While national standards provide baseline criteria, APAI will collect specific criteria from the Sugar Land Fire Department and the Fire Departments serving the other entities in the GRP planning area to help maintain their current Insurance Services Office (ISO) ratings and the City's contractual commitments. These criteria will be summarized and documented for input into the hydraulic analysis.

**e) Task Deliverable:**

**Water Planning Criteria and Boundary Condition Technical Memorandum** - This TM will define and reference all of the established criteria to serve as the basis for the entire water planning effort. This TM would also be the starting point for the future water supply planning in Phase II.

**2) DEVELOP WATER PLANNING DATA**

Population and growth forecast will help define the current and future water demand throughout the defined GRP planning area. The data sources and growth criteria will be defined in the previous task. Water production data including water quality data will also be collected at this time.

**a) Population and Land Use Data**

Based on the agreed sources and boundary conditions developed in the previous task, population data for the City of Sugar Land, the GRP participants, and project future growth areas will be compiled. Approved land use plans and the population and land use plans from the recent wastewater master planning project will be used to define population densities and commercial and industrial demand areas. This data will be used to characterize customer classes and types and to forecast the number of Equivalent Single-Family Connections (ESFC) within the planning area. The Texas Water Development Board is currently developing population and water consumption criteria guidelines for water planning across the State. The Engineer will investigate the status of TWDB planning criteria and other standard water planning criteria. The Engineer will work with the City to confirm the most appropriate planning criteria for this master plan update.

**b) Water Consumption Criteria**

Historic residential, commercial and industrial water billing data will be used to define current

and future water consumption criteria. Conservation patterns and criteria defined in the previous task will be used to determine the projected water consumption per ESFC. Water demand data will be developed by demand type including potable, non-potable, industrial commercial, multi-family, etc. consistent with current City planning criteria. Large volume customers with specialized water demand requirements would also be identified in this subtask

**c) Water Supply Data**

Current and near term (5 year) water supply data will be developed to include; available and future ground water supplies, current surface water supplies and the potential near term non-potable and reuse water applications. The current limits on these various supplies will be characterized over a range of conditions including drought forecasts. Future water supply options will be identified for further evaluation in the Phase II - Future Water Supply Study

**d) Water Production Data & Operating Rules**

Up to 5 years of Historical water production data and water system operating rules will be compiled to support the development and calibration of the water system hydraulic model. These data would include:

- i) Copies of previous reports related to evaluation of water treatment, pumping and distribution facilities.
- ii) Electronic files containing all customer metered water usage. Electronic files should include location (address) of each meter, and monthly metered usage at each location.
- iii) Operational protocols for the system, which may include pump on/off settings, pressure reducing valve settings, etc.
- iv) Run times for the pumps at the pump stations
- v) Tank level data in all storage tanks
- vi) Water quality data for water system, including chlorine residual, TTHMs, HAAs, temperature, pH, alkalinity and other available data.
- vii) Any records of low-pressure or water quality complaints. Map indicating areas of known problems with low or high pressures or water quality

**e) Define Initial Water Planning Scenarios**

Based on the evaluation of the data collected in this task and the criteria and boundary conditions established in Task 1, an initial list of water planning scenarios will be identified to address both near term (5 year) and future demand conditions. Modeling scenarios will cover a variety of current and future demand forecasts under average, peak and low demand operating conditions. Up to 12 modeling scenarios are planned for the modeling analysis in Task 4.C.

**f) Task Deliverable:**

**Data Development Technical Memorandum** - This TM summarizes the data collection, review and compilation effort and provides the foundation for the master plan update as well as other water planning studies. Data gaps will be identified along with a methodology to complete the required planning data. Numerical and graphical summaries of the various data and information will be presented. Reference and supporting data will be organized and provided in electronic form in an Appendix X.

**3) INVENTORY SYSTEM INFRASTRUCTURE ASSETS**

an inventory, including available attributes, of the City's above ground and below ground infrastructure will be developed to support model development and the planning of proposed

infrastructure improvements. The inventory will include modifications and additions that are currently planned or being implemented. Future assets that were identified in the 2007 Master Plan Update or other planning efforts will also be identified in this asset inventory.

**a) Existing Above Ground Assets**

Based the 2007 Water Master Plan Update and on other available data, the inventory of major water production equipment with size, capacity, location, drawings, and other data required for the hydraulic model and planning efforts would be updated. The inventory will included major above ground assets throughout the GRP planning area available from the individual GRP participants. The City's current above ground asset inventory is maintained in their water system GIS. The Engineer will evaluate the current GIS inventory and recommend modifications and additions to improve the asset inventory. The Engineer will incorporate the updated asset inventory data into the City's existing GIS system. The inventory would include:

- i) Ground water Production Plants – including groundwater wells, pumps, storage tanks, disinfection, distribution pumps, etc.
- ii) Surface Water Treatment Plant – basic process components form the new surface water plant that is currently under construction that would focus on production capacity, the high service pump station and storage facilities
- iii) Storage Tanks - including inlet and outlet diameter, diameter of bowl, minimum and maximum water levels, presence of interior screening, baffling or other mixing techniques

**b) Existing Below Ground Assets**

Based on the existing GIS and other base mapping, this inventory would focus on the modeled piping, valves and fire hydrants. The inventory would identify transmission and distribution system piping as well as irrigation and other special piping systems. The Engineer would incorporate additions or changes to the GIS as requested by the City.

**c) Planned Infrastructure Additions and Improvements**

Additions or improvements to above and below ground water system infrastructure that have been planned; are in design; or are in construction will also be added to the overall system inventory with the current status noted. The focus will be on those improvements that will impact the system over the next 5 years. The infrastructure improvements in the 2007 Master Plan Update will be reconciled with the ongoing CIP program.

**d) Future Infrastructure Assets**

Based on growth and annexation forecasts, map and inventory above and below ground assets that have been identified to serve future populations within the GRP planning area. These future assets will be accounted for in the overall planning inventory.

**e) Task Deliverable:**

**Water System Assets Technical Memorandum** - This TM will summarize the fundamental planning data for all of the City's water system assets. It will identify any data gaps required to compile the system analysis and a methodology to obtain any missing data. The Asset inventory will focus on the data and information required for hydraulic modeling. Near term improvements and additions will be included in the 5 year planning cycle. Future assets including water plants, plant expansions and major transmission lines will be identified a map to model future water system conditions. The TM will included summary tables and maps with



detailed supporting data presented in electronic form in Appendix X.

#### **4) ANALYZE THE SYSTEM**

Hydraulics, water quality and other system performance characteristics will be analyzed under current and future planning conditions. The initial water system planning scenarios identified in Task 2 will set the foundation for the overall system analysis. A water accounting model will be developed around the City's Groundwater Reduction Plan to analyze compliance scenarios and provide a tool to manage the GRP.

##### **a) Water Distribution System Model Update**

The Engineer will update the existing distribution model to accurately represent the existing distribution system including current modifications and additions that have been confirmed by the City. The model will be developed using WaterCad Version 8i software. Activities in this Sub-Task would include:

- i) Initial review of existing information and field testing - the Engineer will review the data and information collected in Tasks 2 and 3 and develops recommendations for sampling and pump testing plan to obtain additional data necessary for model setup and calibration. The Engineer would recommend sampling and pump testing program to include suggested locations, timing, frequency and duration of pressure and flow measurements throughout the distribution system. The City will be responsible for operation of the various pumps, valves hydrants, etc. for the specific field testing requirements. The Engineer will coordinate the field testing program with the City and attend, witness and record key system tests.
- ii) Update water system model - the existing model will be evaluated and updated to reflect current conditions and included current infrastructure modifications and additions. The Engineer may expand the model coverage by adding some of the smaller pipelines to improve the overall model accuracy and calibration. The Model update would include the requirements to develop the IDSE System specific Study.
- iii) Develop demand distribution - metering records provided by the CITY will be used to determine demand distributions to each model node under maximum month conditions. Demands from the existing model developed for the 2007 Water Master Plan Update would be assessed and redistributed to improve model accuracy and calibration. Records of hourly pumped flow will then be used to define maximum day flow conditions, identify diurnal flow patterns, and determine additional system demands not captured by the metering records.

##### **b) Model Calibration**

The objective of this task is to calibrate the hydraulic model so that it provides reliable results for subsequent hydraulic evaluations. Model development and calibrations will be consistent with the AWWA M32 is the water modeling manual. Model calibration will focus on a level of detail and accuracy that is sufficient to perform water quality simulations. The model calibration would meet the requirements for the TCEQ IDSE System Specific Study. The following activities are to be completed as part of this Sub-Task:

- i) Update operational rules into model – The Engineer will update system operational rules in the model, including pump trigger rules, minimum and maximum tank levels, etc.
- ii) Calibrate steady state model. Model output (flows and system pressures) will be compared to field-measured system data, as provided by Task 2.1. Model physical parameters will be adjusted to calibrate to the field pressure and flow measurements.
- iii) Perform extended period simulation (EPS) model calibration. Modeled flows, pressures and tank levels will be compared to measured data at hourly intervals for a 48-72 hour

period under maximum day flow conditions. Adjustment of model physical parameters and/or refinements to the demand distribution will be used to calibrate for EPS conditions.

**c) Finalize Modeling Scenarios and Run the Model**

The objective of this task is to use the calibrated hydraulic model to identify improvements required to meet demands and provide adequate pressures to the system for existing and projected future conditions. The system performance criteria defined in Task 1 will provide measurable system goals including maximum allowable velocities, maximum allowable head loss, minimum and maximum pressures, and fire flow criteria the following activities are to be completed as part of this Sub-Task:

- i) Develop demand scenarios - Starting with the initial water system planning scenarios defined in Task 2, demand scenarios for average day, maximum day, peak hour, and minimum hour steady state conditions will be developed. A demand scenario for a maximum day EPS condition will also be developed.
- ii) Perform model runs - steady state model runs will be made for existing demands and future planning scenario demands under maximum day, peak hour and minimum hour demand conditions. Up to 12 modeling scenarios will be run under this Sub-task. EPS model runs will be made under maximum day demand conditions in order to evaluate system performance under tank filling and draining conditions. Winter or low demand EPS runs will be used to evaluate water age and other potential water quality issues. The model runs will identify any current and future system deficiencies and analyze potential infrastructure improvement required to satisfy those deficiencies. This analysis would include an evaluation of increased elevated storage versus enlarging and expanding the systems piping network.

**d) Water Quality Modeling**

In addition to the hydraulic analysis of pressure and flows throughout the distribution system, the calibrated model will also be used to analyze certain water quality parameters in the collection system.

- i) Water Age Analysis – a water age analysis will be performed under a number of different operating scenarios to identify the potential for reduced water quality including low chlorine residuals, nitrification and disinfection byproduct formation. This analysis will form the basis for the IDSE sampling plan.
- ii) Water Blending Analysis – a water blending analysis will be conducted to analyze the proportions of surface water and groundwater at various locations throughout the water system. This analysis will provide an assessment of the extent of the impact of the new surface water supply in the water system and a projection of blended water quality.
- iii) Disinfection residual modeling - an analysis of the disinfection decay and residual across the water distribution system will be developed using the calibrated hydraulic model. The Engineer will work with the City to define disinfection decay testing and data requirements for the model. Bulk decay rate tests will be performed by the City. Pipe wall decay factors will be assumed based on available material and age data. Modeling assumptions will be made for the impact of surface water conversion on the projected disinfection residual profile for the overall water system.
- iv) DBP Analysis – an analysis of the potential for DBP formation will be developed based on modeling results and available water quality data. Impacts of surface water conversion including an analysis of DBP precursors and formation potential would be analyzed. Water age and disinfection residual decay profiles would be used to target potential areas for DBP



formation. Up to 10 additional operational scenarios would be modeled to develop operational recommendations to minimize DBP formation potential and improve water quality.

**e) GRP Accounting Model**

A GRP water accounting model will be developed to assess various water supply and demand scenarios including over conversion and conservation credits. The model would be turned over to the City for ongoing GRP management. The following activities will be included in this Sub-Task:

- i) **Develop GRP accounting model** - The Engineer will work closely with City staff to develop a water accounting model using data from various studies and reports on the system. The GRP accounting model will be used to analyze various water supply and demand scenarios for the City and its GRP participants. In addition to groundwater and surface water resources, the model will analyze non-potable water and water reuse applications, over-conversion and conservation credits and other GRP compliance factors.
- ii) **Define GRP modeling scenarios** – various water planning scenarios will be identified to forecast GRP compliance. These scenarios would include seasonal variations in water supply and demands as well as the impact of drought on surface water supplies and other supply and demand scenarios. Up to 12 different modeling scenarios will be identified and run with the model.
- iii) **Run the GRP model** – The GRP model would be run under the water supply and demand scenarios developed in the previous activity. Results of this analysis would be used with the planning information developed in previous tasks to provide an update to the overall GRP.

**f) Task Deliverables:**

- i) **Water System Analysis Technical Memorandum** - This TM will describe the hydraulic model update process including the existing system calibration, fire flow, water age and surface water blending analysis. The model will be expanded for future conditions. The results of the model runs for the various planning scenarios will be included in this TM.
- ii) **Updated Hydraulic Model** – the updated distribution system hydraulic model will be provided to the City for use in future system evaluations.
- iii) **GRP 2012 Plan Update** - Based on changes to the Sugar Land and other GRP participants systems and forecasts an update to the 2008 GRP will be prepared as a stand-alone document. The update will include the results of the GRP accounting analysis under various operating conditions.

**5) EARLY DELIVERY PLANS**

Early delivery of actionable plans is an integral part of the overall dynamic planning process. Data and information gathered during the initial tasks would be combined with preliminary modeling to deliver plans that are needed before completion of the overall planning project. These early deliverables would include:

- a) **IDSE System Specific Sampling Plan** – The Engineer will work closely with City staff to define the specific near term compliance requirements of the Stage 2 Disinfection Byproducts Rule. The Initial Distribution System Evaluation (IDSE) System Specific Study is designed to identify the highest risk sampling sites for disinfection byproducts in the City's distribution system. The water age and blended water analysis in the previous tasks will be used to analyze the system. Based on modeled water age and the influence of the surface water supply IDSE sampling points

will be identified. The ISDE plan will be prepared with City review and comment for submission to the TCEQ to meet the compliance schedule. The Engineer will work with the TCEQ and the City to obtain TCEQ approval for the IDSE System Specific Study Sampling Plan.

- b) **FY2012-2013 CIP Recommendations** - The Engineer will work closely with City staff to review the 2007 Master Plan recommendations, existing planned CIP projects and other system needs. This information would be combined with preliminary modeling results to identify projects that have a clear need and justification for immediate implementation. The Plan recommendations would be based on initial model results and asset inventory data, the current planned CIP projects would be validated and prioritized with immediate system needs.

#### 6) **CIP PROJECT PLANNING AND PROGRAMMING**

The water system analysis in Task 4 will identify infrastructure additions or modifications required to meet near term as well as long term future needs. The longer term infrastructure concepts will be developed to guide future growth and development and to provide a framework for near term system planning. The focus of this Task will be to prioritize, recommend and program the near term, 5 year, Capital Improvement Program for the City's water system.

- a) **Unconstrained Infrastructure Plan** - Additions and improvements to the Sugar Land water system will be identified and prioritized, based on the model results and asset inventory, with a 10 year planning horizon. This initial shifting of potential infrastructure improvements extends beyond the near term, 5 year planning horizon to identify any high priority projects that may need to be moved up in the planning schedule. This initial comprehensive list of prioritized infrastructure improvements will be developed without fiscal or budgetary constraints to assess future system needs.
- b) **Constrained 5 year CIP** – From the list developed in the previous Sub-Task, infrastructure improvements will be programmed into a near term, 5 year CIP. The 5 year CIP will be adjusted to meet the City's budget constraints and will be programmed for implementation through the City's current capital improvement process. Project descriptions and construction costs estimates will be developed for each project.
- c) **Prioritized Future Projects** – The 10 year infrastructure improvements identified in Sub-Task a, not included in the 5 year CIP, will then be combined with other system needs identified in the future system analysis to develop a prioritized list future water production, transmission and distribution improvements. This future projects list will support the Phase II effort and form the baseline for the next master plan update.
- d) **Task Deliverable:**
  - i) **5-Year CIP Plan** - This Plan will provide the prioritized list of infrastructure addition and improvement projects recommended for the next five year planning period resulting from the near term constrained assessment. The recommended 5 Year CIP will include project descriptions and construction costs estimates that are consistent with the City's overall capital program planning process.
  - ii) **Prioritized System Improvements Technical Memorandum** - This TM will integrate the base unconstrained infrastructure needs assessments for the 10 year planning horizon and the future system assessment sub-tasks. It will provide a comprehensive look at water

infrastructure needs and support future planning efforts.

**7) 2012 WATER MASTER PLAN UPDATE**

**a) Develop Draft Master Plan Summary**

The completed Technical Memorandums and other stand alone deliverables document the basis for the plan, present the results of planning and analysis, and provide detailed recommendations in the form of a 5 year CIP. The Master Plan Summary captures the essence of these earlier deliverables in a concise summary document with a focus on results and recommendations. The Master plan Summary will be written and formatted for an non-technical audience including the City's administration, elected officials and other community stakeholders.

**b) Edit and Finalize Based on City Comments**

The Master Plan Summary will be a key communication to for the Utility Department. The Engineer will work closely with City staff to incorporate staff comments and edits on the draft summary to create a clear and concise document.

**c) Compile Technical Memorandums**

The Technical Memorandums and other deliverables which summarize the base data, system analysis results and recommendations of the various project tasks represent the body of the overall planning effort. The final TM's will be compiled in a binder. The TM's along with all of the electronic supporting data files will also be compiled on a DVD to provide a ready reference to all of the data and information developed as part of the master plan update

**d) 2012 Master Plan Update Presentations**

The master plan results and recommendations along with key information developed in the planning process will be summarized in a PowerPoint presentation. Up to four formal presentations of the 2012 Master Plan Update will be made by the Engineer to stakeholder groups identified by the City. The presentation will also be available for City staff to use in future forums.

**e) Task Deliverables:**

- i) **2012 Water master Plan Update** – The Master Plan Update will consist of the Master Plan Summary and the Technical Memorandum Binder containing all of the interim project deliverables.
- ii) **2012 Water Master Plan Presentation** – the PowerPoint presentation summarizing the 2102 Master Plan Update will be provided to the City along with and supporting presentations and graphic files
- iii) **2012 Water Master Plan Update Appendix X** – all of the digital files including data files and electronic version of the interim deliverables and final Master Plan Summary will be provided in electronic form for future use by the City.

**8) PROJECT MANAGEMENT AND QUALITY CONTROL**

- a) **Kick-Off Meeting** – A Project Kick-Off Meeting will be held to review the overall project objectives, scope, schedule, and delivery plan. Data and information requirements will be reviewed along with the data acquisition and overall project communication plan

- b) **Progress Meetings and Reporting** – Periodic project progress meetings will be held at key milestones to discuss results and present action plans to advance the project. Due to the accelerated schedule for key early delivery items, a brief weekly conference call will be scheduled to identify information needs and data issues between progress meetings. A monthly progress report will be submitted with each invoice.
- c) **Quality Control** – The quality control process will begin with the development of a Project Plan and a Zero Percent QC meeting. The Zero Percent QC meeting provides senior management technical oversight and corporate experience to each project execution plan. Project deliverables will go through a quality review process. There are three basic types of deliverables:
- i) **Technical Memorandums** – Technical memorandums document the data, analysis and results that form the basis for the master plan update. Their primary purpose is to advance and document the technical development of the project. These are stand alone, less formal documents and the QC review will focus on technical content.
  - ii) **Plans** – Interim results, recommendations and action plans will be submitted throughout the project. These plans are more formal, stand alone documents with actionable recommendations and action plans. The Plans will be reviewed by the project quality Control Committee for technical content and format.
  - iii) **Master Plan Summary** – This document is the final deliverable for this phase and will be developed for public consumption and will be reviewed for technical content and format.



## **PHASE II - FUTURE WATER SYSTEM PLAN**

While Phase I focused on the near term, 5-year CIP plan, Phase II address longer term water supply, demand, and infrastructure issues as well as policy issues that will impact the future of water in the City of Sugar Land. The Phase I - 2012 Water Master Plan Update will provide a new baseline for future system planning. The specific data and information developed in Phase I will be used to define the detailed scope and budget for Phase II. A detailed scope and budget for Phase II will be prepared for City approval to amend this contract. No work on Phase II will proceed without written authorization from the City.

The water resource landscape in Fort Bend County will continue to evolve through groundwater reduction, drought, population dynamics, and regulatory requirements. The City's annexation plans coupled with its organic growth will drive future water demands. Future water system plans must also recognize groundwater sustainability and potential adjustments in the Subsidence District's regulatory plan. The City will have to incorporate individual MUDs and other GRP participants into an integrated, operating, water system to meet GRP requirements. The continued utilization of reclaimed water and other non-potable water sources will provide sustainable secondary water supplies. Surface water sustainability must consider the future drought profile of the Brazos River and the protection of the Oyster Creek watershed to meet future water quality demands. In general the Phase II – Future Water System Plan will address the following issues:

### **A Vision for the Future**

A plan for the City's water system will be developed that reflects the City's Comprehensive Plan and Vision. Phase II will set policy and develop strategies to implement the water related goals and objectives of the Vision. Specifically, Phase II of the Water Master Plan will focus on taking the existing Vision and further define it by identifying goals and objectives and specific strategies and initiatives to accomplish the Vision.

The following goals identified in Vision 2025 will be included:

- Maintaining a safe, secure, efficient, and quality water system
- Providing well designed and well maintained water infrastructure
- Water conservation
- Water resource development and source water protection
- Reduced energy consumption
- Incorporation of environmental sustainability concepts
- City as a leader - model for standards, processes and operations

Phase II will create goals, objectives, strategies and projects and provide a basis for key performance measures in the future. Phase II will involve a robust public input process to develop these goals, objectives, strategies. The public input process will provide input on potential conflicting city goals such as water conservation and landscaping.

### **Water Resource Development**

Future alternative water supply options identified in the 2012 Water Master Plan Update will be further defined in terms of availability, drought contingency, development costs, and water rights. Alternative potable water supplies should consider surface water and ground water development strategies to meet potable demands as well as raw water, reuse, and stormwater harvesting to meet



non-potable demands. Innovative water resource concepts including inter-basin transfers, sea and brackish groundwater desalination, and reuse for potable supply should also be considered. A triple bottom line analysis of long term water resource development would balance economic considerations with social and environmental benefits.

#### **Enhanced Infrastructure Asset Management**

Optimizing the cost and timing of infrastructure maintenance, repair, rehabilitation, and replacement over an asset's useful or economic life cycle requires advanced asset management business processes and software systems. A review and benchmark of the City's existing asset management business processes and software systems will provide an overall plan for continuous improvement in this critical utility management area.

#### **Security, Vulnerability, and Risk**

The City's existing vulnerability and risk assessments of the water system require periodic updates to reflect system changes. The next step would be evaluating alternative levels of security at the various water supply and treatment facilities to mitigate risk and secure those systems from outside threats. A cost-benefit analysis of increase security measures would be considered.

#### **Sustainable Water Policy Development**

In light of the water vision and 2012 Water Master Plan Update, a number of City policies should be addressed and opened for possible revision. Water policy updates, including conservation, reuse, cost of service, energy conservation, etc. would be addressed in a public forum with the briefings, presentations, and documentation required to achieve public policy objectives.

#### **Public Involvement Program**

Stakeholder participation and buy-in can play an important role in achieving strategic water resource development and water policy objectives. Development of a Citizen Advisory Committee or other community stakeholder forum can help create a better understanding of water issues facing the City and build support through meetings, presentations, and briefings. A public outreach plan and public information materials can also be developed to support the Utility's Water Vision.

#### **Sustainable Infrastructure**

The City has a substantial investment in both its above ground and below ground water infrastructure. An overview of the investment in existing water utility infrastructure and the need to plan and budget for future renewal investments are an integral part of an overall asset management program. Asset useful life and survival data can be applied to major asset groups and pipe systems to support infrastructure renewal funding.

## **ADDITIONAL SERVICES**

Various ADDITIONAL SERVICES that are not within the scope of the BASIC ENGINEERING SERVICES covered by the preceding paragraphs, may be performed or arranged for separately by the City, or may be added to the ENGINEER's responsibilities by mutual agreement and written authorization. Any services desired by the City under these SPECIAL SERVICES provisions require advance written authorization, including establishment of a negotiated fee ceiling for each task authorized, before ENGINEER may proceed.

1. Modeling additional water planning scenarios beyond the 12 provided in Basic Services as requested by the City
2. Additional presentations of the master plan results and recommendations to stakeholder groups, commissions, GRP participants, or others beyond the 4 presentations covered in task 7.d.
3. Implementation and training services for the GRP accounting model as requested by the City.
4. Modifications to the City's existing GIS or other water system software requested by the City to incorporate the data and information developed as part of the water planning effort.
5. Additional chlorine residual decay testing and tracer studies to more accurately calibrate the disinfection residual modeling developed in Task 4.C as requested by the City.
6. Other planning, engineering and environmental services not covered in the Basic services but requested by the City in conjunction with this project

## **COMPENSATION**

Subject to all terms and conditions of this Agreement, the City shall pay and the ENGINEER agrees to accept full compensation for Water Planning Services performed pursuant to this Agreement on a time and materials basis according to the Hourly Fee Schedule provided on the page that follows. The specific compensation for Basic and Special Services are:

1. For Phase I Basic Services - Compensation to the ENGINEER for Basic Services associated with Phase I – 2012 Water Master Plan Update are based on Engineering Services Estimate included in the pages that follow. The total compensation for Basic Services shall not exceed the amount of \$ 185,000 without written authorization from the City.
2. For Additional Services- Compensation for additional services shall be specifically requested and authorized by the City and shall not exceed the amount of \$25,000 without written authorization from the City

Monthly invoices will include a detailed listing of personnel time and expenses.

For Reimbursable Expenses incurred under this Agreement by the ENGINEER, the City shall pay the actual expenditures made by the ENGINEER, including any sales tax ENGINEER is legally required to pay in the interest of the project while performing services requested by the City.

## **SCHEDULE**

Phase I of the project should be completed within 12 months of the notice to proceed based on the Project Schedule which follows. The IDSE System Specific Sampling Plan will be completed in June of

2012 based on preliminary model and system analytical results in order to meet the City's TCEQ schedule requirements.

**CITY OF SUGAR LAND  
WATER MASTER PLANNING SERVICES  
HOURLY FEE SCHEDULE  
2012**

Staff Description	Staff Code	2012 Rate
Admin Staff	A1-A3	\$ 70.00
Senior Admin Staff	A4	\$ 85.00
Designer/Technician	C1-C2	\$ 85.00
Senior Designer/Technician	C3-C4	\$ 110.00
Engineer-in-Training/Scientist-in- Training	ES1-ES3	\$ 105.00
Project Engineer/Scientist	ES4	\$ 125.00
Senior Project Engineer/Scientist	ES5	\$ 140.00
Project Manager	ES6	\$ 160.00
Senior Project Manager	ES7	\$ 210.00
Principal	ES8-ES9	\$ 240.00

Billing rates may be adjusted by up to 4 percent annually (at the beginning of each calendar year) during the term of this agreement.

A multiplier of 1.10 will be applied to all direct expenses

**City of Sugar Land - Water Master Plan  
Phase I - Basic Engineering Services Fee estimate**

Task/Sub-Task		Estimated Hours	Estimated Fee
<b>1</b>	<b>DEFINE PLANNING CRITERIA AND BOUNDARY CONDITIONS</b>	<b>70</b>	<b>\$ 9,800</b>
a	Define the 2007 Baseline	12	\$ 1,700
b	City of Sugar Land Planning criteria	12	\$ 1,700
c	Regulatory	12	\$ 1,700
d	Fire Protection Criteria	8	\$ 1,200
e	Prepare Tech Memo	26	\$ 3,600
<b>2</b>	<b>DEVELOP WATER PLANNING DATA</b>	<b>122</b>	<b>\$ 15,100</b>
a	Population and Land Use Updates	22	\$ 2,500
b	Water Consumption Criteria	16	\$ 1,900
c	Water Supply Data	16	\$ 1,900
d	Water production data & operating rules	16	\$ 1,900
e	Define initial water planning scenarios	16	\$ 2,100
f	Prepare Technical Memorandum	36	\$ 4,800
<b>3</b>	<b>INVENTORY SYSTEM INFRASTRUCTURE ASSETS</b>	<b>128</b>	<b>\$ 15,500</b>
a	Above Ground Assets	32	\$ 3,800
b	Below Ground Assets	32	\$ 3,800
c	Planned asset additions or improvements	16	\$ 1,900
d	Future Infrastructure Assets	20	\$ 2,500
e	Prepare Technical Memorandum	28	\$ 3,500
<b>4</b>	<b>ANALYZE THE SYSTEM</b>	<b>540</b>	<b>\$ 66,700</b>
a	Water Distribution System Model Update	97	\$ 11,200
b	Model Calibration	153	\$ 18,000
c	Finalize modeling scenarios and run the model	77	\$ 9,100
d	Water Quality modeling	112	\$ 15,600
e	GRP Accounting Model	68	\$ 9,000
f	Prepare TM & GRP Update	33	\$ 3,800
<b>5</b>	<b>EARLY DELIVERY PLANS</b>	<b>120</b>	<b>\$ 15,900</b>
a	IDSE Sampling Plan	60	\$ 7,900
b	FY2012-2013 CIP Recommendations	60	\$ 7,900



	Task/Sub-Task	Estimated Hours	Estimated Labor Fee
<b>6</b>	<b>CIP PROJECT PLANNING AND PROGRAMMING</b>	<b>135</b>	<b>\$ 17,900</b>
	a Unconstrained Infrastructure Plan	44	\$ 6,000
	b Constrained 5 year CIP	34	\$ 4,300
	c Prioritized Future Projects	40	\$ 5,400
	d Prepare CIP Plan and System Plan	17	\$ 2,100
<b>7</b>	<b>2012 WATER MASTER PLAN UPDATE</b>	<b>122</b>	<b>\$ 16,800</b>
	a Develop Draft Master Plan Summary	72	\$ 10,000
	b Edit and finalize based on City Comments	17	\$ 2,100
	c Compile Tech Memos	9	\$ 1,000
	d 2012 Master Plan Update Presentations	24	\$ 3,700
<b>8</b>	<b>PROJECT MANAGEMENT AND QC</b>	<b>122</b>	<b>\$ 22,100</b>
	a Project Kick-off Meeting	20	\$ 3,600
	b Progress meetings and progress reports	80	\$ 13,800
	c Quality Control	22	\$ 4,600
	<b>Total Labor</b>	<b>1,359</b>	<b>\$179,700</b>
	<b>Direct Expenses</b>		
	Travel		\$ 4,800
	Reproduction		\$ 500
	<b>Sub-Total Direct Expenses</b>		<b>\$ 5,300</b>
	<b>Total Fee</b>		<b>\$ 185,000</b>

# City of Sugar land - Water Master Plan - Project Schedule

Overall Phase I schedule in Months

